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**Harris**

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- (54) **ADDRESS SHARING NETWORK**
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- (22) Filed: **Nov. 9, 2012**

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**Related U.S. Application Data**

- (63) Continuation of application No. 12/614,398, filed on Nov. 7, 2009, now Pat. No. 8,312,123.

- (51) **Int. Cl.**  
**G06F 15/16** (2006.01)
- (52) **U.S. Cl.** ..... **709/223**; 709/238; 270/331; 270/474
- (58) **Field of Classification Search** ..... 709/223; 370/331, 474  
See application file for complete search history.

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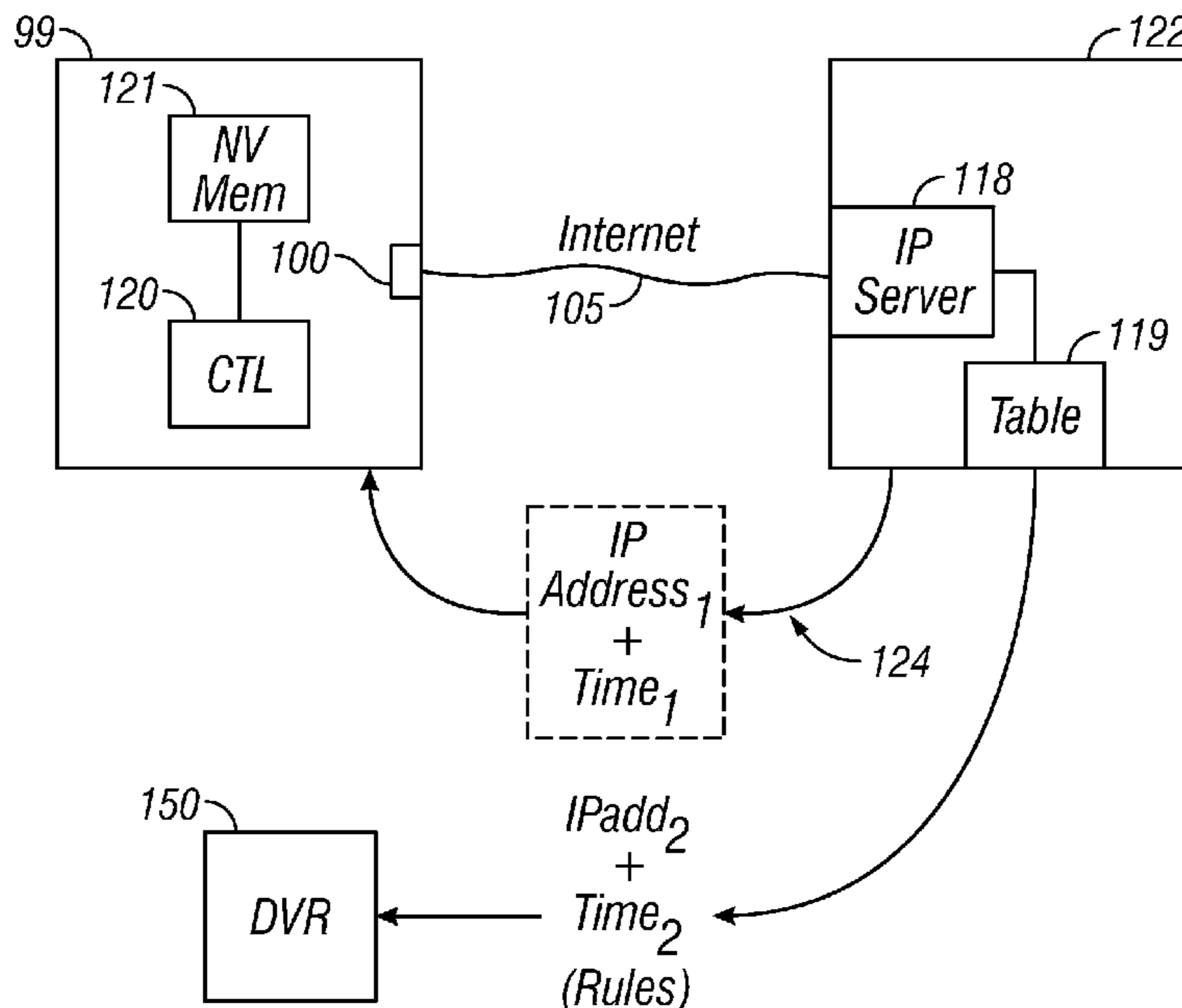
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(57) **ABSTRACT**

Network IP sharing techniques are described. An ip address can be assigned that is only valid for a specified time, so that the same IP address can be used for multiple different units, but each IP address is valid only for certain time periods. Another technique describes using the network to continually provide a time indication.

**15 Claims, 2 Drawing Sheets**



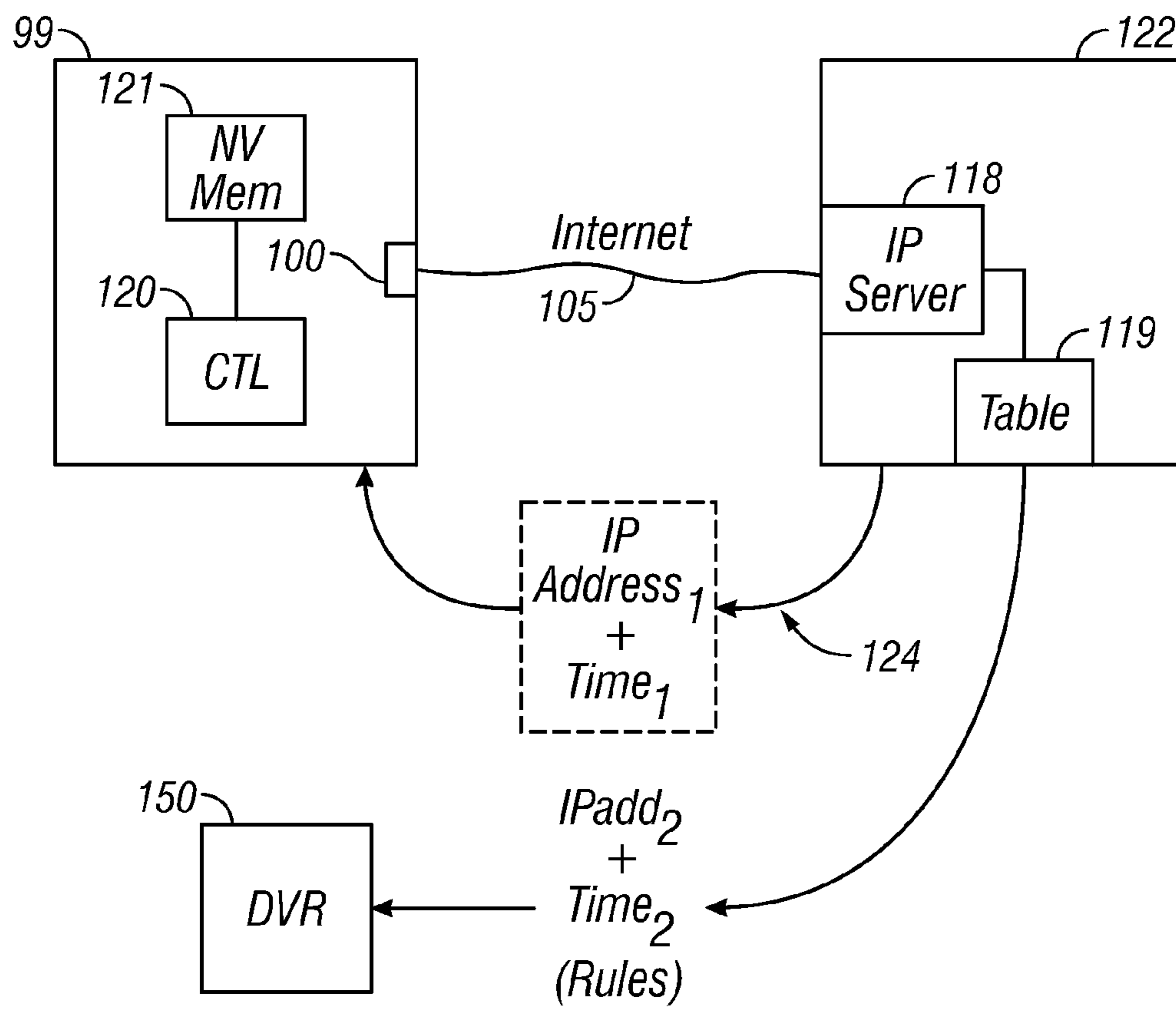


FIG. 1

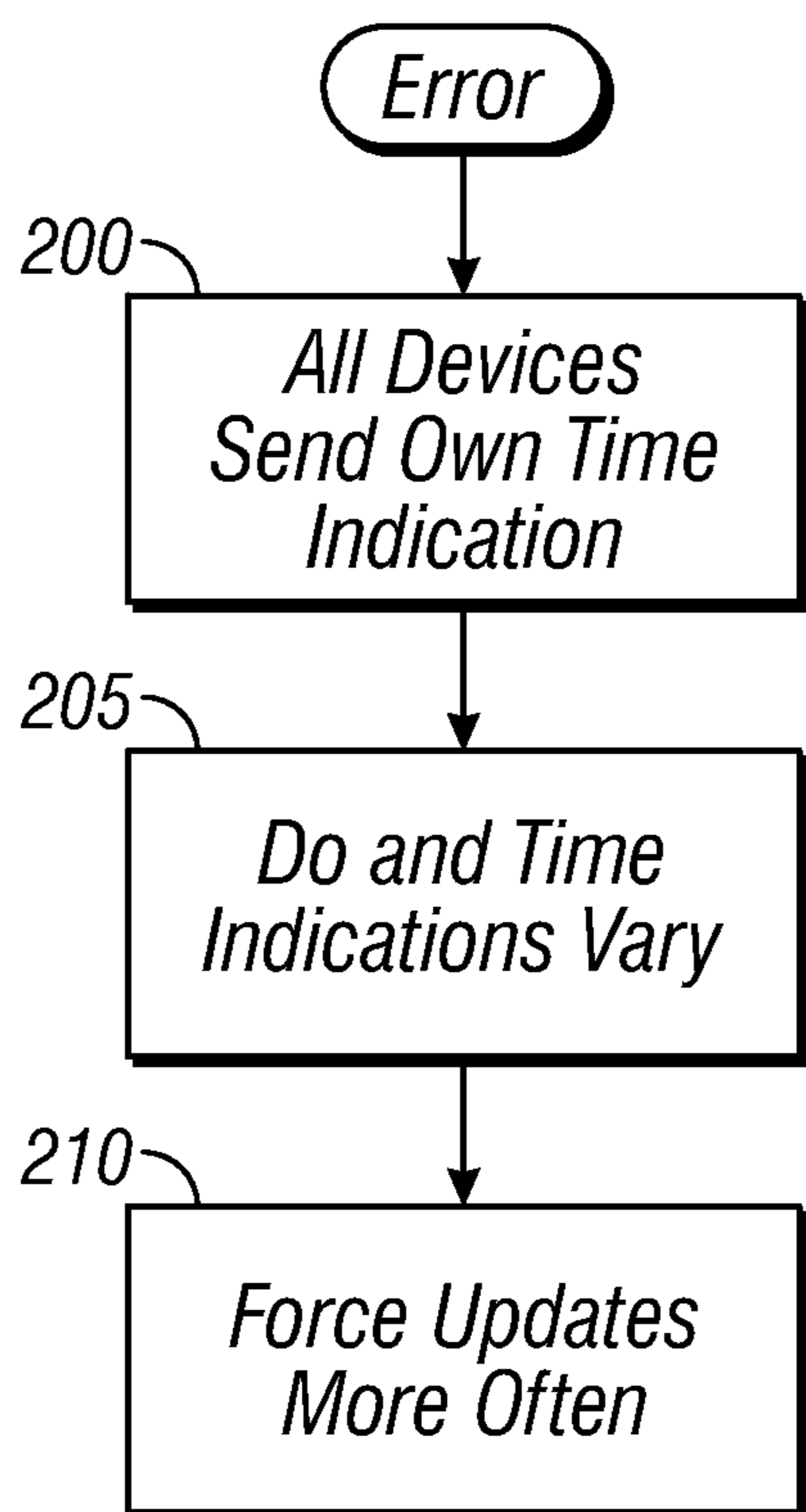


FIG. 2

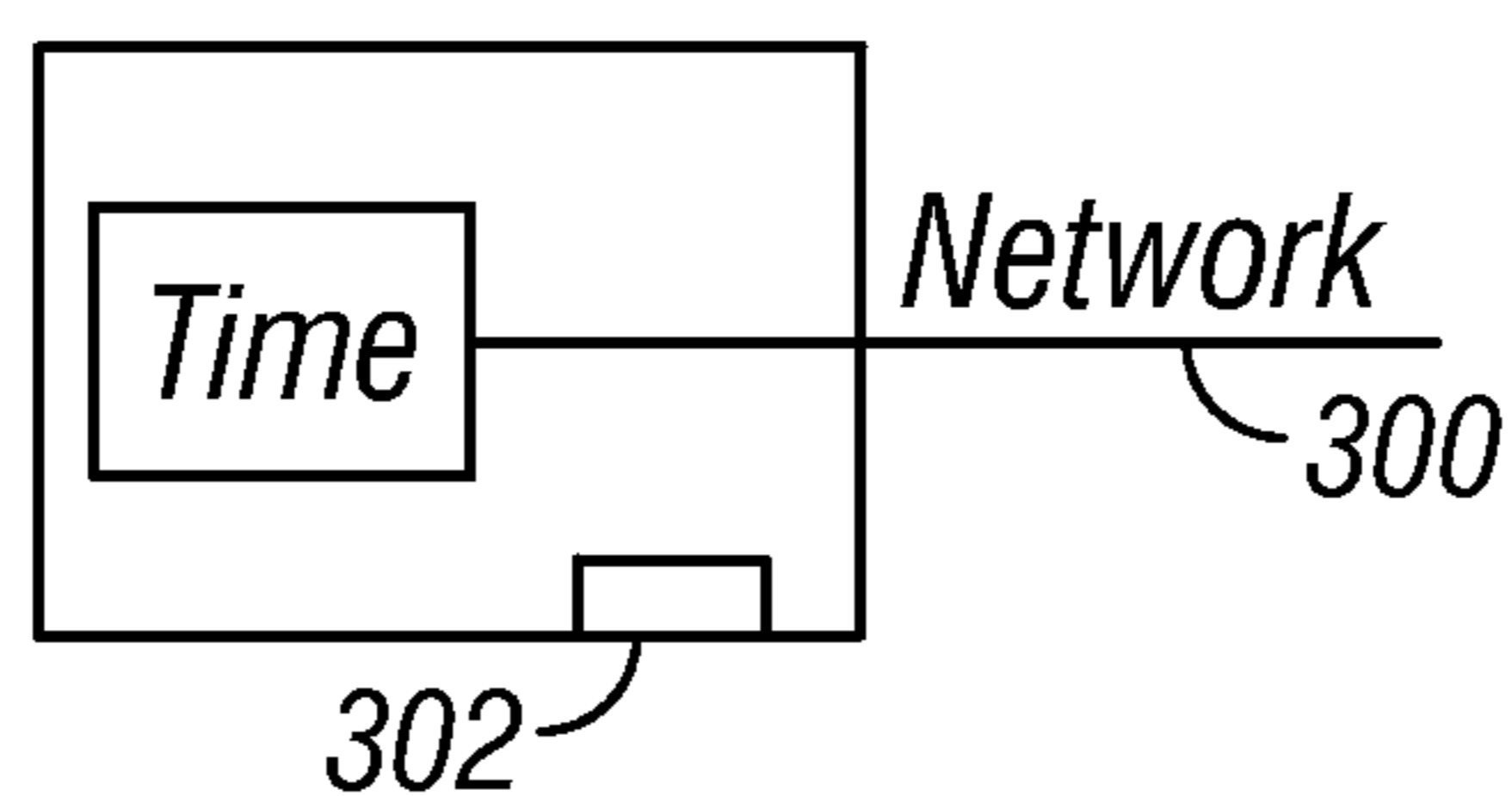


FIG. 3

**1****ADDRESS SHARING NETWORK****CROSS-REFERENCE TO RELATED APPLICATIONS**

This application is a continuation application of U.S. Ser. No. 12/614,398 filed Nov. 7, 2009, now U.S. Pat. No. 8,312,123 issued Nov. 13, 2012, the entire contents of which are herewith incorporated by reference in its entirety.

**BACKGROUND**

Many different devices are known which use a connection through a user's local network. Conventionally, these devices identify themselves to the network, using a network identification scheme such as an Internet address or IP address. IP addresses are intended to be unique addresses which are used by the system only once, never to be used again. DHCP servers automatically assign IP addresses to devices on the network.

The addresses may include an outside address, e.g., of the network itself, as well as the IP address of the internal device on the network, in order to contact or unambiguously describe the device.

Many such devices which assign IP addresses have a limited bank of numbers that they can use. In any case, it becomes more complex to keep track of items by their IP address.

One alternative, such as used by some schemes, defines a longer address, e.g., it uses more digits. This still requires some server to keep track of the addresses, in order to avoid address conflicts.

**SUMMARY**

An embodiment describes a network-connected appliance, and addresses that can be used with this network-connected appliance.

An embodiment describes addressing in a network connected device which does not constantly need input from a network.

Another embodiment describes specific network connected appliances.

Another embodiment describes a network connected appliance which automatically forms its address without a supervising server (e.g., like a DHCP server).

**BRIEF DESCRIPTION OF THE DRAWINGS**

In the Drawings:

FIG. 1 shows a basic embodiment of a network connected appliance; and

FIG. 2 shows an error handling routine for the router; and  
FIG. 3 shows a clockless clocked device.

**DETAILED DESCRIPTION**

While the above describes "IP addresses", it should be understood that other forms of addresses can also be used to identify items attached to a network.

It is recognition of the current embodiment that there are really two different kinds of devices that are on the network. Some devices, such as computers, can make use of continuous network updates, e.g., for user-requested internet access or file access to other computers, or to obtain content such as media files or television.

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Other devices, however, may receive updates rarely or only periodically. These latter devices typically receive updates which do not which are less time-critical.

FIG. 1 illustrates one such device attached to the Internet, here an Internet-based clock **99**. This Internet-based clock is connected to the Internet via port **100** which may be a WiFi port or may be a wired port. The Internet clock receives time information from the Internet, for example from the NIST Internet Time service which provides time that is synchronized to the National Institute of standards and technology time. This may use the network Time protocol RFC-1305.

In one embodiment, the clock itself also has the capability of maintaining time. Therefore, the time updates over the network connection **105** need only be carried out periodically. For example, the clock may have circuitry that is sufficiently accurate to maintain time between 24 hour spacings between synchronizations.

According to an embodiment, a controller **120** within the clock communicates with IP assigning server **118** in a router **122**. In this embodiment, a configuration defines how often communication will be carried out. The configuration can be a preset configuration (once per day, for example) or can be a settable parameter. The indication of how often sync occurs is sent to the router as **122**. The router stores an internal table **119** indicating devices and their addresses, e.g., IP addresses. This table **119** includes devices which use non-constant connection to the network. A determination is also made, by either the router or the clock, of how long each sync will take. This is used to decide how long a period will be assigned.

Based on the information stored in the internal table **119** of the router, the router returns at **124** an IP address and a time code representing a periodic time during which the IP address is valid. For example, from 12:35 PM through 12:40 PM every day, the clock **99** may have the IP address 192.168.0.254. That IP address is valid for the clock **99**, however, only during those times. Other periodic times may be used; e.g., every 150 minutes, or ten minutes after every odd hour, or anything else.

This information is returned to the device **99** and stored in its network information memory **121**.

Other units may also be connected to the network **105** and controlled by the router **122**. For example, DVR **150** may also receive network access only once or a few times a day, e.g., for program guide updates. DVR **150** may receive the same IP address IP 192.168.0.254, but may receive different time codes that go with that IP address. In this particular situation, the IP address 192.168.0.254 may be valid over multiple time periods, for example from every hour until five minutes after every hour. The DVR **150** may receive a time message as part of the communication to maintain its future sync.

Other units may also be on the same network.

If two units attempt to communicate at the same time, it may mean that one of those units has lost its time. Accordingly, this probably indicates that one of the devices is not keeping accurate time. The router may also determine how much time adjustment is made at each interval, e.g., by asking the unit for its local time before sending the new time.

FIG. 2 illustrates an error routine which is carried out when there is a time error that is executed when there are any errors. At **200**, each of the devices is commanded to determine its internal time indication. At **205**, a determination is made if any of those time indications differ from the real time by more than a certain amount. In one embodiment, if the time variance is a number of minutes, the system may force updates of time at more frequent intervals, for example every four hours. If the time is erroneous by a longer period of time, the system may mark the device as possibly having an error, and check it

again in the future. For example, the second time that the device has an error of this type that is uncorrectable by more frequent updates may cause the device to be marked as malfunctioning clock, and removed from the periodic IP chart.

Another embodiment shown in FIG. 3 receives network-based information constantly, e.g., once a second. This embodiment allows carrying out a clock function without having circuitry that forms an internal clock. Instead, this uses the time information in that network based information 300 as its internal time unit. For example, an internet based clock which displays time can simply display network time at all times. So long as the network time is up to date, the clock display will be up to date. A DVR or any clock operated device can operate in the same way.

This simplifies the circuitry, since the only circuit needed is a communication circuit. In one embodiment, the device communicates via wifi, and wholly gets its time information from the realtime wifi signals. In the embodiment, the device may have a wired connection port—here a mini usb port 302, that allows a direct connection to another device such as a laptop or network, for initial configuration. For example, a direct connection to the device may bring up a webpage that allows configuration via the locally connected computer. Other configuration techniques may also be used.

Another embodiment describes a “charm” that receives its information such as time over the network. The “charm” can also receive other information over the network such as weather or other information. The charm can change color based on the network information. In one embodiment the color of the charm can change for different current weather, e.g. be red when the weather is hot and blue when the weather is cold. The color can also change for different times of day, e.g., yellow for morning, brown for evening. The color can change for dates, e.g., white for weekdays, green for weekends.

While this calls such a device a “charm”, the charm can have any desired footprint, for example, it can be a desktop device.

Although only a few embodiments have been disclosed in detail above, other embodiments are possible and the inventors intend these to be encompassed within this specification. The specification describes specific examples to accomplish a more general goal that may be accomplished in another way. This disclosure is intended to be exemplary, and the claims are intended to cover any modification or alternative which might be predictable to a person having ordinary skill in the art. For example, other applications can be used. Another embodiment can auto form the “IP” address without needing a DHCP server. A unique id in the appliance (e.g., the type and/or its serial number) are used as the IP-like address. In these embodiments, the “time assigning server” described in previous embodiments may be replaced by an automatic assigning server. This device can be used in any time-oriented electronic device, including any of the above mentioned items, as well as DVRs, TVs, sprinkler controllers, Ovens, garage openers, refrigerators (to determine times when the cooling can run less aggressively) or any other device can be used.

Those of skill would further appreciate that the various illustrative logical blocks, modules, circuits, and algorithm steps described in connection with the embodiments disclosed herein may be implemented as electronic hardware, computer software, or combinations of both. To clearly illustrate this interchangeability of hardware and software, various illustrative components, blocks, modules, circuits, and steps have been described above generally in terms of their functionality. Whether such functionality is implemented as

hardware or software depends upon the particular application and design constraints imposed on the overall system. Skilled artisans may implement the described functionality in varying ways for each particular application, but such implementation decisions should not be interpreted as causing a departure from the scope of the exemplary embodiments of the invention.

The various illustrative logical blocks, modules, and circuits described in connection with the embodiments disclosed herein, may be implemented or performed with a general purpose processor, a Digital Signal Processor (DSP), an Application Specific Integrated Circuit (ASIC), a Field Programmable Gate Array (FPGA) or other programmable logic device, discrete gate or transistor logic, discrete hardware components, or any combination thereof designed to perform the functions described herein. A general purpose processor may be a microprocessor, but in the alternative, the processor may be any conventional processor, controller, microcontroller, or state machine. A processor may also be implemented as a combination of computing devices, e.g., a combination of a DSP and a microprocessor, a plurality of microprocessors, one or more microprocessors in conjunction with a DSP core, or any other such configuration. These devices may also be used to select values for devices as described herein.

The steps of a method or algorithm described in connection with the embodiments disclosed herein may be embodied directly in hardware, in a software module executed by a processor, or in a combination of the two. A software module may reside in Random Access Memory (RAM), flash memory, Read Only Memory (ROM), Electrically Programmable ROM (EPROM), Electrically Erasable Programmable ROM (EEPROM), registers, hard disk, a removable disk, a CD-ROM, or any other form of storage medium known in the art. An exemplary storage medium is coupled to the processor such that the processor can read information from, and write information to, the storage medium. In the alternative, the storage medium may be integral to the processor. The processor and the storage medium may reside in an ASIC. The ASIC may reside in a user terminal. In the alternative, the processor and the storage medium may reside as discrete components in a user terminal.

In one or more exemplary embodiments, the functions described may be implemented in hardware, software, firmware, or any combination thereof. If implemented in software, the functions may be stored on or transmitted over as one or more instructions or code on a computer-readable medium. Computer-readable media includes both computer storage media and communication media including any medium that facilitates transfer of a computer program from one place to another. A storage media may be any available media that can be accessed by a computer. By way of example, and not limitation, such computer-readable media can comprise RAM, ROM, EEPROM, CD-ROM or other optical disk storage, magnetic disk storage or other magnetic storage devices, or any other medium that can be used to carry or store desired program code in the form of instructions or data structures and that can be accessed by a computer. Also, any connection is properly termed a computer-readable medium. For example, if the software is transmitted from a website, server, or other remote source using a coaxial cable, fiber optic cable, twisted pair, digital subscriber line (DSL), or wireless technologies such as infrared, radio, and microwave, then the coaxial cable, fiber optic cable, twisted pair, DSL, or wireless technologies such as infrared, radio, and microwave are included in the definition of medium. Disk and disc, as used herein, includes compact disc (CD), laser disc, optical

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disc, digital versatile disc (DVD), floppy disk and blu-ray disc where disks usually reproduce data magnetically, while discs reproduce data optically with lasers. Combinations of the above should also be included within the scope of computer-readable media.

Also, the inventors intend that only those claims which use the words “means for” are intended to be interpreted under 35 USC 112, sixth paragraph. Moreover, no limitations from the specification are intended to be read into any claims, unless those limitations are expressly included in the claims. The computers described herein may be any kind of computer, either general purpose, or some specific purpose computer such as a workstation. The programs may be written in C, or Java, Brew or any other programming language. The programs may be resident on a storage medium, e.g., magnetic or optical, e.g. the computer hard drive, a removable disk or media such as a memory stick or SD media, or other removable medium. The programs may also be run over a network, for example, with a server or other machine sending signals to the local machine, which allows the local machine to carry out the operations described herein.

Where a specific numerical value is mentioned herein, it should be considered that the value may be increased or decreased by 20%, while still staying within the teachings of the present application, unless some different range is specifically mentioned. Where a specified logical sense is used, the opposite logical sense is also intended to be encompassed.

The previous description of the disclosed exemplary embodiments is provided to enable any person skilled in the art to make or use the present invention. Various modifications to these exemplary embodiments will be readily apparent to those skilled in the art, and the generic principles defined herein may be applied to other embodiments without departing from the spirit or scope of the invention. Thus, the present invention is not intended to be limited to the embodiments shown herein but is to be accorded the widest scope consistent with the principles and novel features disclosed herein.

What is claimed is:

1. A network controller, comprising:
  - a network address reading device that receives internet protocol (IP) addresses from multiple different devices that are connected to said network address reading device over a network connection,
    - where the network address reading device recognizes a same IP address as said first IP address for communication with both of at least first and second different network connected devices among said multiple different devices, and where the network address reading device also recognizes at least one additional item of information in addition to said first IP address, where a first value of said additional item of information indicates that said first IP address represents communication from said first network connected device, and a second value of said additional item of information indicates that said first IP address represents communication from said second network connected device,
      - wherein said additional item of information is a code that is associated with said first IP address and without which said first IP address cannot be validly used.
  - 2. The controller as in claim 1, wherein said additional item of information represents a time during which said first IP address is usable by one of said network connected devices and outside of which time said first IP address is not usable by said one of said network connected devices.

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3. The controller as in claim 1, wherein said additional item of information allows said first IP address to be used only at specified times by a particular device, and not to be used outside said specified times.

4. The controller as in claim 1, wherein said network address reading device also receives information indicative of current time from both said first and second different network connected devices.

5. The controller as in claim 1, wherein said network address reading device also determines a condition where said first and second devices are using the same IP address without properly using said additional item of information, and automatically forces both said first and second devices to automatically update their respective additional item of information.

6. A network controller, comprising:
 

- a network address assignment device that assigns internet protocol (IP) addresses to multiple different devices that are connected to said network address assignment device over a network connection,
  - where the network address assignment device assigns a same IP address as said first IP address to be used for communication with at least first and second different network connected devices, such that both said first and second network connected devices use the same first IP address, and where the network address assignment device also assigns at least one additional item of information in addition to said first IP address, where said additional item of information is different for said first network connected devices than it is for said second network connected device;
    - wherein said device assigns said first IP address along with a first value of said additional item of information to represent said first network connected device, and assigns said first IP address along with a second value of said additional item of information, determines which of the first and second devices is represented by said first IP address,
      - wherein said additional item of information is a code that is associated with said first IP address and without which said first IP address cannot be validly used.

7. The controller as in claim 6, wherein said additional item of information represents a time during which said IP address is usable by one of said network connected devices and outside of which time said IP address is not usable by said one of said network connected devices.

8. The controller as in claim 6, wherein said additional item of information is one that allows said first IP address to be used only at specified times by a particular device.

9. The controller as in claim 6, wherein said network address assignment device also assigns and sends information indicative of current time to both said first and second different network connected devices.

10. The controller as in claim 6, wherein said network address assignment device also determines said first and second devices using the same first IP address without properly using said additional item of information, and automatically forces both said first and second device to automatically update their respective additional item of information.

11. A method of operating over a network, comprising:
 

- receiving internet protocol (IP) addresses from multiple different devices that are connected to a network address reading device over a network connection;
  - recognizing a same IP address as said first IP address for communication with both of at least first and second different network connected devices among said multiple different devices, where said recognizing also rec-

ognizes at least one additional item of information in addition to said first IP address,  
recognizing a first value of said additional item of information to indicate that said first IP address represents communication from said first network connected device, and  
recognizing a second value of said additional item of information to indicate that said first IP address represents communication from said second network connected device, wherein said additional item of information is a code that is associated with said first IP address and without which said first IP address cannot be validly used.

**12.** The method as in claim **11**, wherein said additional item of information represents a time during which said first IP address is usable by one of said network connected devices and outside of which time said first IP address is not usable by said one of said network connected devices.

**13.** The method as in claim **11**, wherein said additional item of information allows said first IP address to be used only at specified times by a particular device, and not to be used outside said specified times.

**14.** The method as in claim **11**, further comprising also receiving information indicative of current time from both said first and second different network connected devices.

**15.** The method as in claim **11**, further comprising determining a condition where said first and second devices are using the same IP address without properly using said additional item of information, and automatically forcing both said first and second devices to automatically update their respective additional item of information.

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